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PROJECT NO. 55999

**REPORTS OF THE ELECTRIC
RELIABILITY COUNCIL OF TEXAS**

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**PUBLIC UTILITY COMMISSION

OF TEXAS**

**ELECTRIC RELIABILITY COUNCIL OF TEXAS, INC.'S
NOTICE OF ACCEPTANCE OF A TIER 3 TRANSMISSION PROJECT**

Pursuant to ERCOT Protocol Section 3.11.4.9(1), Electric Reliability Council of Texas, Inc. (ERCOT) files this Notice of the ERCOT Regional Planning Group (RPG)'s acceptance of a Tier 3 transmission project submitted by LCRA Transmission Services Corporation (LCRA TSC), as reflected in Attachments A-B. LCRA TSC is the ERCOT-registered Transmission Service Provider (TSP) responsible for the transmission project. ERCOT is prepared to provide the Commission with any additional information it may request regarding this matter.

Dated: July 1, 2024

Respectfully Submitted,

/s/ Katherine Gross

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June 19, 2024

Mr. Sandeep Borkar
Director, Transmission Planning
LCRA TSC
3505 Montopolis Drive (Building D)
Austin, TX 78744

RE: LCRA Sim Gideon - Cedar Hill Transmission Line Upgrade Project

Dear Mr. Borkar:

The Electric Reliability Council of Texas (ERCOT) Regional Planning Group (RPG) has reviewed and accepted the following Tier 3 transmission project in accordance with ERCOT Protocol Section 3.11.4:

LCRA Sim Gideon – Cedar Hill Transmission Line Upgrade Project:

- Rebuild the existing Sim Gideon to Bastrop City 138-kV and Bastrop City to Swiftex 138-kV transmission lines, approximately 9.98-mile, using double-circuit structures with one circuit in place with a conductor rated at 942 MVA or greater.
- Upgrade the existing Cedar Hill 138-kV substation to a breaker and a half arrangement.
- Rebuild the existing Elgin Tap to Cedar Hill 138-kV transmission line, approximately 2.9-mile, using double circuit capable structures with two circuits in place with conductors rated at 942 MVA or greater. The south circuit will connect Cedar Hill and Swiftex 138-kV substations, and the north circuit will connect Cedar Hill and Elgin 138-kV substations, eliminating the Elgin Tap.
- Rebuild the remainder of the existing transmission line from Cedar Hill to Swiftex 138-kV, approximately 7.08-mile, using double-circuit structures with one circuit in place with a conductor rated at 942 MVA or greater.
- Rebuild the remainder of the existing transmission line from Cedar Hill to Elgin Substation 138-kV, approximately 2.2-mile, using double-circuit structures with one circuit in place with a conductor rated at 942 MVA or greater.
- Ensure the ratings of all associated terminal equipment meet or exceed 2000 A.

Should you have any questions please contact me at any time.

Sincerely,

A handwritten signature in black ink that reads "Kristi Hobbs". The signature is written in a cursive, flowing style.

Kristi Hobbs
Vice President, System Planning and Weatherization
Electric Reliability Council of Texas

cc:

Pablo Vegas, ERCOT
Woody Rickerson, ERCOT
Prabhu Gnanam, ERCOT
Robert Golen, ERCOT
Brandon Gleason, ERCOT

Sim Gideon – Cedar Hill Transmission Line Upgrade Project

ERCOT Regional Planning Group Submission

LCRA Transmission Services Corporation

April 30, 2024



TRANSMISSION PLANNING

Table of Contents

Table of Contents.....	2
Executive Summary	3
1 Project Description.....	4
1.1 Project Area	4
1.2 Project Need	6
1.3 Recommended Project Scope	6
1.4 Recommended Project Cost Estimates	8
1.5 Recommended Project Benefits.....	9
2 Alternatives and Study Assumptions	9
2.1 Alternatives Evaluated	9
2.2 Steady-State Study Design and Criteria.....	10
2.3 Stability Study Design and Criteria.....	11
2.4 Short Circuit Study Design and Criteria.....	11
2.5 Subsynchronous Resonance (SSR) Vulnerability Assessment Criteria	12
3 Assessments and Findings	12
3.1 Steady-State Analysis.....	12
3.2 Stability Analysis	12
3.3 Short Circuit Analysis	13
3.4 Subsynchronous Resonance (SSR) Vulnerability Analysis	13
4 Summary and Conclusion	13

Executive Summary

LCRA Transmission Services Corporation (LCRA TSC) recommends the Sim Gideon – Cedar Hill Transmission Line Upgrade Project to the ERCOT Regional Planning Group. Sim Gideon – Cedar Hill is a 22.2-mile 138-kV transmission line in Bastrop County.

This submission describes the Sim Gideon – Cedar Hill Transmission Line Upgrade Project, which will increase the ampacity of the transmission line, upgrade Cedar Hill Substation, mitigate the loss of transmission service to Elgin Substation for the contingency loss of the 6.9-mile Elgin Tap to Swiftex line section, enable future provision of looped and breakered transmission service to Elgin Substation, improve the deliverability of dispatchable generation resources, improve physical reliability and resiliency to extreme weather, reduce the frequency and duration of forced outages, enhance public safety, and ensure compliance with industry standards.

In the scope of the recommended project, LCRA TSC will rebuild the existing Sim Gideon – Cedar Hill Transmission Line with steel monopoles, H-frames, or lattice towers. The transmission line will be double-circuit capable with bundled 959 ACSS Suwannee conductor (conductor rating of 942 MVA) for its entire length. LCRA TSC will also install OPGW fiber.

This project is a Corrective Action Plan (CAP) developed in the NERC TPL-001-5.1 transmission planning assessments completed for the LCRA TSC Transmission System Improvement Plan and ERCOT Regional Transmission Plan (2023-SC15 Sim Gideon Area 138-kV Line Upgrades).

The recommended project completion date is May 15, 2027.

The cost estimate for the project is \$77,900,000.

This project is not expected to require an amendment to LCRA TSC's Certificate of Convenience and Necessity (CCN). Pursuant to Section 3.11.4.3 of the ERCOT Nodal Protocols, the recommended project should be categorized as a Tier 3 project.

1 Project Description

1.1 Project Area

The Sim Gideon – Cedar Hill Transmission Line is in Bastrop County and consists of three 138-kV transmission circuits: T608 Sim Gideon to Swiftex, T367 Swiftex to Cedar Hill, and T728 Elgin Tap to Elgin Substation. (Elgin Tap is a three-way tap located between Swiftex and Cedar Hill). The total combined line length is 22.2 miles, or 10.0, 10.0, and 2.2 miles, respectively, for each circuit.

LCRA TSC owns all terminal equipment at Sim Gideon, Swiftex, and Cedar Hill substations, and Oncor owns all terminal equipment at Elgin Substation. Bluebonnet Electric Cooperative owns load-serving transformation facilities at Swiftex and Cedar Hill substations. LCRA Wholesale Power Services owns the Sim Gideon Power Plant, a 620 MW natural gas generation facility with three units. Lost Pines 1 Power Project, a 640 MW combined cycle natural gas generation facility, is physically co-located with the Sim Gideon facility and connects to the adjacent 345-kV Lost Pines Substation.

Figure 1 is a schematic diagram of the Sim Gideon – Cedar Hill Transmission Line. Note that Sim Gideon – Cedar Hill is connected to Bastrop City Substation via a normally open switch.

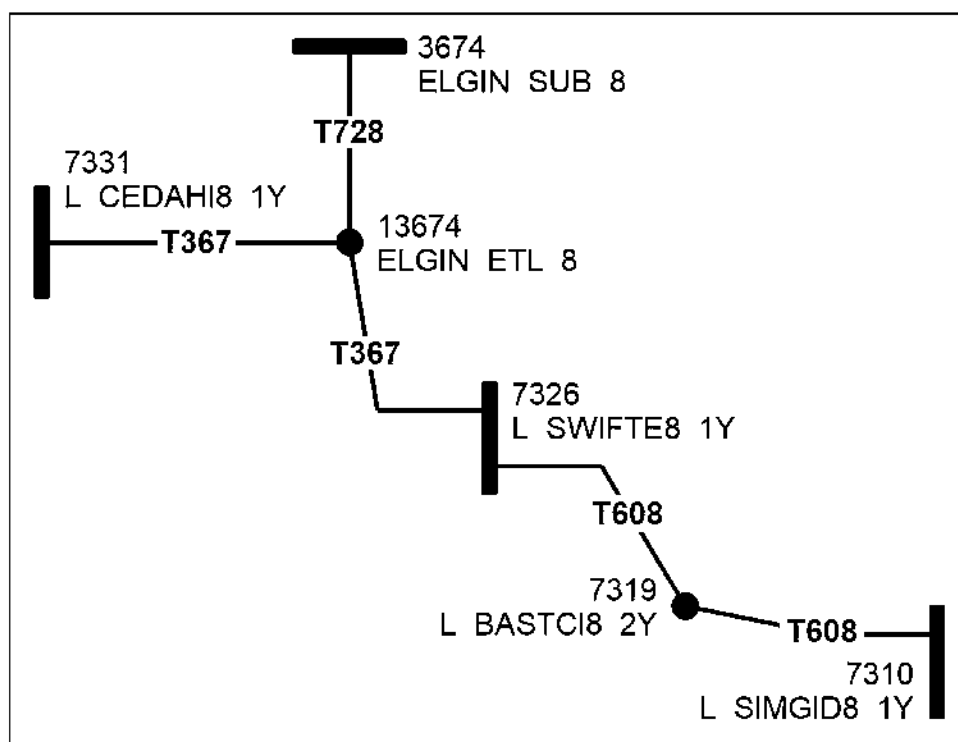


Figure 1: Sim Gideon – Cedar Hill Transmission Line Schematic Diagram

Figure 2 is a map of the Sim Gideon – Cedar Hill Transmission Line and surrounding area, with its route highlighted in teal.

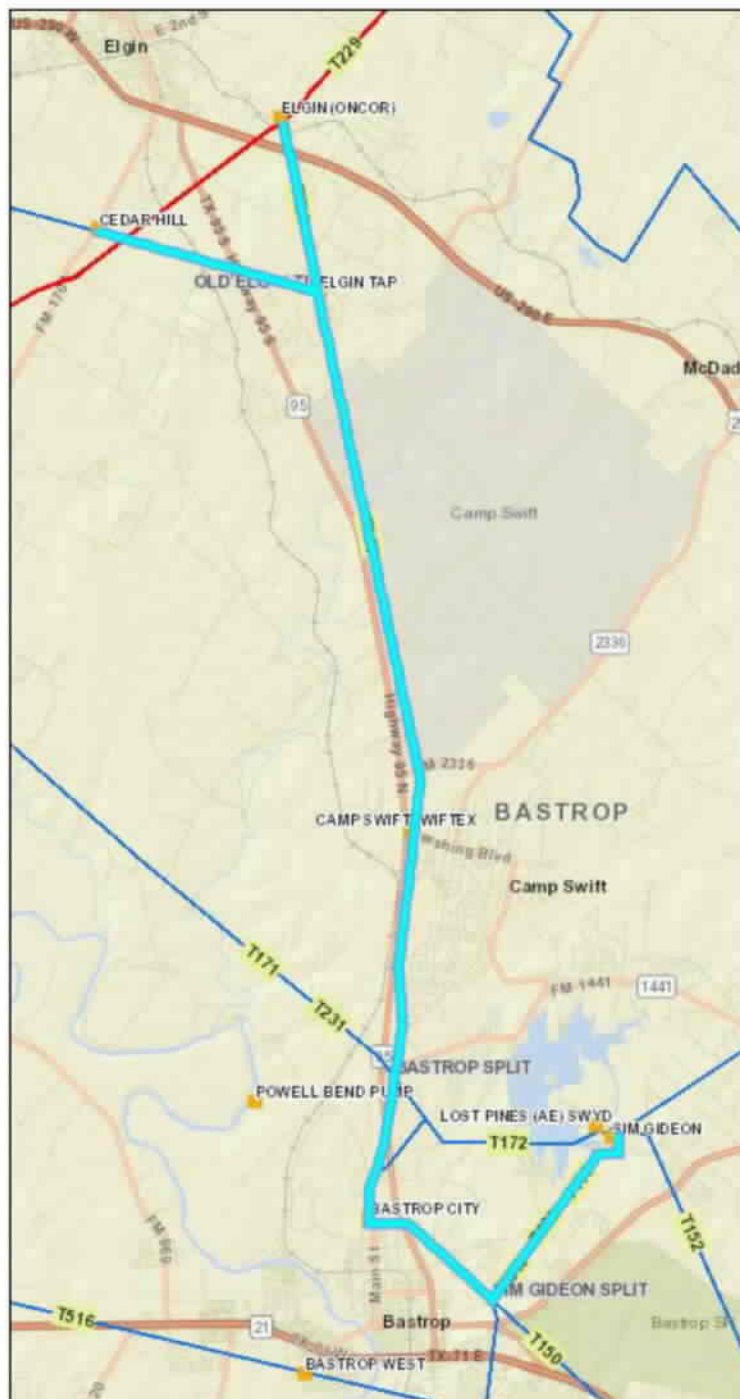


Figure 2: Sim Gideon – Cedar Hill Transmission Line Map

West of Cedar Hill, this transmission line continues to Manor, Shadow Glen, Harris Branch, and McNeil substations, with the latter located near I-35 in north Austin. The US Highway 290 corridor between Austin and Elgin has grown rapidly in recent years and much of the load in this area is served by the 138-kV transmission line between Sim Gideon and McNeil substations, of which Sim Gideon – Cedar Hill is the most heavily loaded portion.

1.2 Project Need

This project is a Corrective Action Plan (CAP) developed in the NERC TPL-001-5.1 transmission planning assessments completed for the LCRA TSC Transmission System Improvement Plan and ERCOT Regional Transmission Plan (2023-SC15 Sim Gideon Area 138-kV Line Upgrades). The steady-state analysis portion of these assessments determined that Sim Gideon – Cedar Hill is heavily loaded in pre-contingency (NERC P0) conditions and will overload under the ERCOT 1 common tower outage of the Austrop to Dunlap & Daffin Gin 138-kV line, Sim Gideon to Bastrop City & Settlers 138-kV line, or Lost Pines to Austrop & Dunlap 345-kV line. These contingency events are similar in that they disconnect transmission elements linking generation sources at Sim Gideon and Lost Pines substations to the load-serving transmission system at Austrop and Dunlap substations and thereby cause increased transfers via Sim Gideon – Cedar Hill towards Elgin, Manor, and Austin.

This reliability need has been observed in ERCOT real-time operations: in July 2022, and from June to September 2023, T608 accumulated \$38.6 million in real-time congestion rent. T608 was congested between 2 and 9 pm on summer peak load days and was not due to other outages. The contingency event was the common tower contingency loss of the Austrop to Daffin Gin & Decker to Dunlap 138-kV circuits, which is electrically adjacent to the Austrop to Dunlap & Daffin Gin contingency event identified in the reliability analysis. On September 8, 2023, ERCOT issued Market Notice W-C090823-01 that identified T608 as an irresolvable transmission constraint.

In addition, Section (III)(B)(2) of the LCRA TSC Transmission System Planning Criteria requires that radial substations with peak load greater than 20 MW be provided with looped transmission service. Elgin Substation, which is served radially from Sim Gideon – Cedar Hill, has served peak load greater than 20 MW and is forecasted to continue to serve peak load greater than 20 MW, and should therefore be provided looped transmission service. T728 had also been identified as a candidate for a transmission line overhaul project to improve transmission system reliability and enhance public safety by increasing the physical reliability of conductor and structures.

This project also supports long-term resiliency objectives by replacing wood structures with more reliable and safer steel structures, increasing the capacity of 138-kV connections using existing right-of-way, and anticipating fast-paced regional economic development needs.

1.3 Recommended Project Scope

In the recommended project scope, LCRA TSC will rebuild the existing Sim Gideon – Cedar Hill Transmission Line. The new transmission structures will be steel monopoles, H-frames, or lattice towers. The transmission line will be double-circuit capable with bundled 959 ACSS Suwannee conductor (conductor rating of 942 MVA) for its entire length, as detailed below:

- **Sim Gideon to Structure 306 (Sim Gideon Split)** – T608 is a 138-kV double-circuit line with T150 Sim Gideon to Alum Creek and shares a common right-of-way with T410 Bastrop West to Sim Gideon & T648 Sim Gideon to Tahitian Village, which are on a separate 138-kV double-circuit line. This section is 2.9 miles long; in this section, T608 will be rebuilt on separate double-circuit capable structures with one circuit installed initially, and T150 Sim Gideon to Alum Creek will be installed on a separate single-circuit line.

- **Structure 306 (Sim Gideon Split) to Elgin Tap** – T608 and T367 is a single-circuit line, excluding a 0.5-mile portion near Bastrop City. This section is 6.9 miles long and will be rebuilt using double-circuit capable structures with one circuit installed initially.
- **Elgin Tap to Cedar Hill** – T367 is a single-circuit line. This section is 2.9 miles long and will be rebuilt using double-circuit capable structures with two circuits installed initially. The south circuit will connect Cedar Hill and Swiftex, and the north circuit will connect Cedar Hill and Elgin Substation. Cedar Hill Substation will be upgraded to a breaker-and-a-half design to accommodate the termination of the new circuit to Elgin Substation; the ultimate layout will be considerate of future 138-kV and 345-kV transmission system needs.
- **Elgin Tap to Elgin Substation** – T728 is a single-circuit line. This section is 2.2 miles long and will be rebuilt using double-circuit capable structures with one circuit installed initially. A short span of the line near Elgin Substation will retain the existing transmission conductor to avoid replacement of substation A-frames and other terminal equipment at Elgin Substation; by leaving the existing conductor and terminal equipment in place, these upgrades can be deferred until additional capacity or upgrades are needed.

LCRA TSC will upgrade substation equipment at Sim Gideon, Swiftex, and Cedar Hill substations to accommodate the larger bundled 959 ACSS Suwannee conductor and to ensure a minimum 2000 A line ratings; by leaving limiting substation equipment in place, upgrades can be deferred until additional capacity or upgrades are needed.

In addition, LCRA TSC will install single Optical Ground Wire (OPGW) fiber as the shield wire on the rebuilt transmission lines per the LCRA TSC Telecommunications System Performance and Expansion Criteria.

Figure 3 is a schematic diagram of the Sim Gideon – Cedar Hill Transmission Line after the recommended project is implemented.

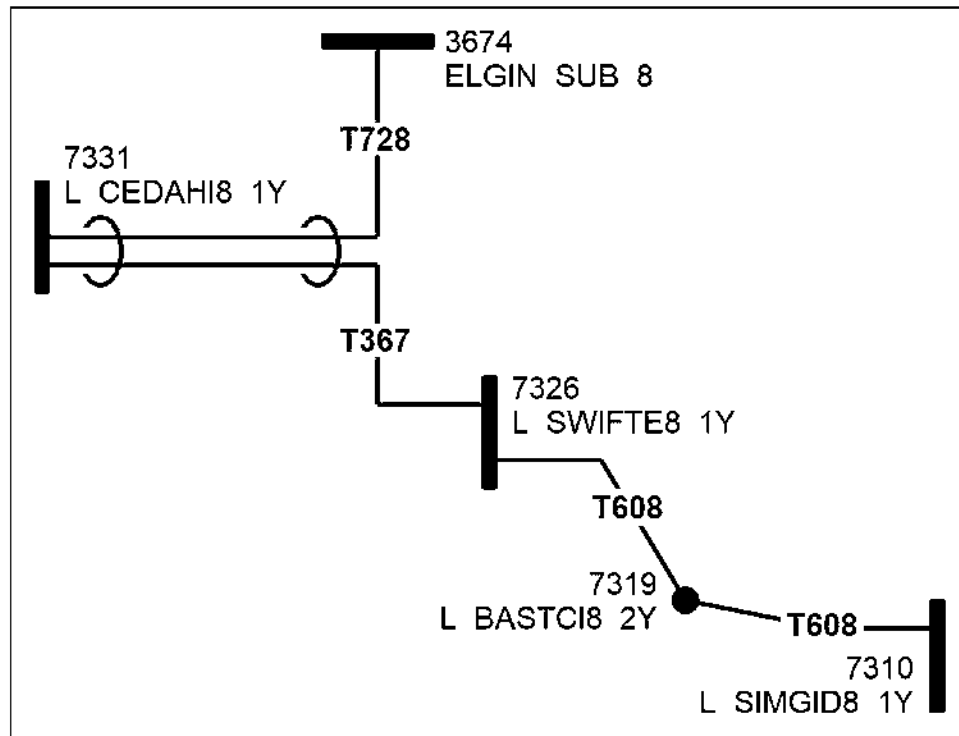


Figure 3: Sim Gideon – Cedar Hill Transmission Line Recommended Project

Table 1 gives the existing and planned ratings for the transmission circuits that will be upgraded in the recommended project scope. Rate 1, Rate 2, and Rate 4 are the normal, emergency, and conductor ratings.

Table 1: Existing and planned ratings

TL #	From	To	Length (miles)	kV	Existing Ratings (MVA)			Planned Ratings (MVA)		
					Rate 1	Rate 2	Rate 4	Rate 1	Rate 2	Rate 4
T608	Sim Gideon	Swiftex	9.98	138	223	223	223	478	478	942
T367	Swiftex	Cedar Hill	9.98	138	223	223	223	473	563	942
T728	Elgin	Elgin Tap	2.22	138	69	69	71			
		Cedar Hill	5.20	138				69	69	942

The recommended project completion date is May 15, 2027.

1.4 Recommended Project Cost Estimates

The cost estimate for the Sim Gideon – Cedar Hill Transmission Line Upgrade is \$77,900,000. This estimate is based on the latest available data and is subject to revision as additional factors may be identified.

This project is not expected to require an amendment to LCRA TSC's Certificate of Convenience and Necessity (CCN). Pursuant to Section 3.11.4.3 of the ERCOT Nodal Protocols, this project should be categorized as a Tier 3 project.

1.5 Recommended Project Benefits

The recommended project will improve and enhance the reliability of the LCRA TSC and ERCOT systems in several ways. The project will:

- Increase the ampacity of the Sim Gideon – Cedar Hill Transmission Line
- Upgrade Cedar Hill Substation to accommodate future expansion, including a 345/138-kV autotransformer addition served via the adjacent T181 & T229 Austrop to Sandow 345-kV double-circuit transmission line
- Mitigate the loss of transmission service to Elgin Substation for the contingency loss of the 6.9-mile Elgin Tap to Swiftex line section
- Enable future provision of looped and breakered transmission service to Elgin Substation, either by installing an in-and-out loop from Swiftex or by reenergizing a deenergized 138-kV transmission line from Elgin Substation to Elgin Switch
- Improve the deliverability of dispatchable generation resources to serve load in peak load or net-load conditions
- Improve physical reliability and resiliency to extreme weather, reduce the frequency and duration of forced outages, enhance public safety, and ensure compliance with industry standards
- Install OPGW, which supports transmission operations and protective relaying

2 Alternatives and Study Assumptions

LCRA TSC evaluated the feasibility of different alternatives to upgrade the Sim Gideon – Cedar Hill Transmission Line. The objective of the steady-state, short circuit, and stability analyses is to assess how the recommended alternative will affect the LCRA TSC and ERCOT systems.

2.1 Alternatives Evaluated

In the recommended alternative, LCRA TSC will rebuild the existing Sim Gideon – Cedar Hill Transmission Line. The new transmission structures will be steel monopoles, H-frames, or lattice towers. The transmission line will be double-circuit capable with bundled 959 ACSS Suwannee conductor (conductor rating of 942 MVA) for its entire length. LCRA TSC will also install OPGW fiber.

LCRA TSC evaluated and rejected an alternative to install a single-circuit capable transmission line. LCRA TSC determined that this alternative would be of similar cost and complexity as the recommended alternative, whereas the double-circuit capability in the recommended alternative will permit the expansion of the 138-kV transmission corridor between Sim Gideon and Elgin since installing a second circuit would only require the installation of additional conductor and monopole deadend structures at relatively moderate cost. Expansion of this 138-kV transmission corridor would also better accommodate a 345/138-kV autotransformer addition at Cedar Hill, which is adjacent to the T181 & T229 Austrop to Sandow 345-kV double-circuit transmission line. The rejected single-circuit alternative does not provide this additional capacity or expandability.

LCRA TSC also evaluated and, after coordination with Oncor, deferred an alternative to provided looped service to Oncor-owned Elgin Substation. The recommended alternative is compatible

with contemplated future upgrades to provide looped and breakered transmission service to Elgin Substation, which can be achieved by installing an in-and-out loop from Swiftex (i.e., by installing a second conductor on the double-circuit capable line and a small number of additional deadend structures) or by reenergizing a deenergized Oncor-owned 138-kV transmission line from Elgin Substation to Elgin Switch, and by replacing a short span of line into Elgin Substation and terminal equipment inside Elgin Substation.

And, in the future, if reliability or economic transmission planning assessments demonstrate a need for more transmission capacity, substation facilities will be upgraded to achieve the full rating of bundled 959 ACSS Suwannee conductor.

2.2 Steady-State Study Design and Criteria

For peak load conditions, the steady-state study used the 2026 summer on-peak cases published by the ERCOT Steady State Working Group in June 2023, as modified for the LCRA TSC annual NERC TPL-001-5.1 transmission planning assessment. For off-peak load conditions, the steady-state study used the 2024 fall on-peak case.

- 23SSWG_2026_SUM1_Final_06022023.raw
- 23SSWG_2024_FAL1_Final_06022023.raw

The swing bus was moved from WA Parish 5 (Bus 110015) in Fort Bend County to Martin Lake 3 (Bus 120043) in Rusk County.

Table 2 lists mothballed and retired generators in the vicinity of the study area that were removed from service. The status of these generators was confirmed at the time of the study.

Table 2: Mothballed, Switchable, and Retired Generators

Status	Generator Name	Bus	ID	County	Size (MW)
Mothballed	JT Deely 1	170121	L1	Bexar	420
Mothballed	JT Deely 2	170122	L2	Bexar	420
Retired	Decker Creek ST 2	170152	N2	Travis	420
Retired (2025)	VH Braunig ST 1	170131	N1	Bexar	217
Retired (2025)	VH Braunig ST 2	170132	N2	Bexar	230
Retired (2025)	VH Braunig ST 3	170133	N3	Bexar	412
Retired (2027)	Coleto Creek	160121	L1	Goliad	655
Retired (2027)	OW Sommers ST 1	170123	N1	Bexar	420

Load was scaled in North and East Texas to account for load and generation changes and bring the swing bus into its normal operating range.

Load forecasts at Paige and Bastrop West substations were decreased by 50 MW and increased by 43 MW, respectively, to reflected revised load forecasts submitted to LCRA TSC by Bluebonnet Electric Cooperative.

The solution engine for the contingency analysis was full Newton-Raphson, and post-contingency adjustments assumed that tap settings for autotransformers were locked.

The analysis evaluated system performance using contingency events defined in Table 1 of the NERC TPL-001-5.1 Transmission System Planning Performance Requirements standard and in Section 4.1.1 of the ERCOT Planning Guide.

- Single contingency (NERC P1 and NERC P2.1)
- Common tower outage (NERC P7 and ERCOT 1)
- Generator + single contingency or common tower outage (NERC P3 and ERCOT 2)
- 345/138-kV autotransformer + single contingency or common tower outage (ERCOT 3)
- Single contingency + single contingency or common tower outage (ERCOT Maintenance Outage Reliability Criteria, in the off-peak case only)

For ERCOT 3 contingencies, the 345/138-kV autotransformers in the Central Texas region were modeled as being unavailable. Similarly, for NERC P3 and ERCOT 2 contingencies, thermal and solar generators in the Central Texas region were modeled as being unavailable. The generator contingencies model individual generators for coal, natural gas steam, natural gas combustion, and solar generators, and full trains for natural gas combined cycle generators.

The analysis did not strictly evaluate system performance following contingency events that allow non-consequential load shed (i.e., NERC P2.2, P2.3, P2.4, P4, P5, and P6) but did take them into consideration.

The following criteria were applied:

- Pre-contingency steady-state thermal loading of a transmission element shall not exceed the continuous rating (Rate 1) of the element
- Post-contingency steady-state thermal loading of a transmission element shall not exceed the emergency rating (Rate 2) of the element
- Pre-contingency steady-state voltage shall not be less than 0.95 pu
- Post-contingency steady-state voltage shall not be less than 0.92 pu
- Pre- and post-contingency steady-state voltage shall not be greater than 1.05 pu
- Post-contingency steady-state voltage deviation shall not be greater than 0.08 pu
- Post-contingency steady-state voltage deviation shall not be greater than 0.07 pu at 3 or more buses (substations)

The steady-state analysis compared the base case with and without the recommended project in-service.

2.3 Stability Study Design and Criteria

The recommended project involves a rebuild of existing transmission lines using a conductor with similar characteristics and does not significantly change transmission system topology. Due to minimal impact on the stability margins of the transmission system, a stability study was deemed unnecessary for this project.

2.4 Short Circuit Study Design and Criteria

The ERCOT System Protection Working Group (SPWG) future year 2027 case, released in June 2023, was used to perform the short circuit analysis.

2.5 Subsynchronous Resonance (SSR) Vulnerability Assessment Criteria

The Sim Gideon – Cedar Hill Transmission Line does not connect to or operate at 345-kV; hence, an SSR assessment is not required by Section 3.22.1.3 of the ERCOT Nodal Protocols.

3 Assessments and Findings

The steady-state analysis evaluated the impact of the recommended project on the ERCOT and LCRA TSC systems. This analysis indicated that the recommended project mitigates the overload that occurs on Sim Gideon – Cedar Hill following certain ERCOT 1 and ERCOT 3 contingency events and promotes the reliability of the LCRA TSC and ERCOT systems, particularly the load-serving 138-kV network in Bastrop and Travis counties.

3.1 Steady-State Analysis

Table 3 shows the line loading on Sim Gideon – Cedar Hill for the most severe ERCOT 1 common tower outage contingency events in the base case in peak load conditions. (The loading on T367 is for the circuit between Swiftex and Elgin Tap.)

Table 3: Sim Gideon – Cedar Hill Post-Contingency Loading

Category	Contingency Event	Base		Upgraded	
		T608	T367	T608	T367
NERC P0	n/a	99%	88%	46%	41%
ERCOT 1	Austrop to Dunlap & Daffin Gin	113%	102%	53%	48%
ERCOT 1	Sim Gideon to Bastrop City & Settlers	112%	101%	52%	48%
ERCOT 1	Lost Pines to Austrop & Dunlap	112%	101%	52%	48%

The ERCOT 3 unavailability of a Dunlap 345/138-kV autotransformer increases the overloads in Table 3 approximately 5 to 7 percent.

The steady-state analysis showed that these overloads can be mitigated by dispatching the Sim Gideon generation units below their maximum capacity in peak load conditions; however, this would violate ERCOT Planning Guide Section 4.1.1.7 Minimum Deliverability Criteria and is not a viable long-term solution to mitigate thermal overloads.

In the upgrade case, no overloads were observed since system topology was approximately the same and the impedance of Sim Gideon – Cedar Hill was similar in both cases, whereas the line ratings of T608 and T367 more than doubled from the base case to the upgrade case.

No thermal violations were observed in off-peak load conditions.

No voltage violations were observed in the peak load or off-peak load conditions that are relevant to the study area or to the recommended project.

3.2 Stability Analysis

Not applicable.

3.3 Short Circuit Analysis

LCRA TSC conducted a short circuit analysis to assess the impact of the upgraded transmission lines between Sim Gideon and Cedar Hill substations using the ERCOT SPWG Future Year 2027 case. Based on the results of this analysis, the maximum fault duty at Sim Gideon Substation increased to 38.1 kA and maximum fault duty at Cedar Hill increased to 11.2 kA. The existing 138-kV circuit breakers at Sim Gideon Substation are rated at 63 kA and the existing 138-kV circuit breakers at Cedar Hill are rated at 40 kA.

The LCRA TSC short circuit analysis confirmed that the short circuit increase requirement is met, and no adverse impacts were identified due to the transmission line upgrades.

3.4 Subsynchronous Resonance (SSR) Vulnerability Analysis

Not applicable.

4 Summary and Conclusion

This submission describes the Sim Gideon – Cedar Hill Transmission Line Upgrade. The project will increase the ampacity of the transmission line, upgrade Cedar Hill Substation, mitigate the loss of transmission service to Elgin Substation for the contingency loss of the 6.9-mile Elgin Tap to Swiftex line section, enable future provision of looped and breakered transmission service to Elgin Substation, improve the deliverability of dispatchable generation resources, improve physical reliability and resiliency to extreme weather, reduce the frequency and duration of forced outages, enhance public safety, and ensure compliance with industry standards.

In the scope of the recommended project, LCRA TSC will rebuild the existing Sim Gideon – Cedar Hill Transmission Line with steel monopoles, H-frames, or lattice towers. The transmission line will be double-circuit capable with bundled 959 ACSS Suwannee conductor (conductor rating of 942 MVA) for its entire length. LCRA TSC will also install OPGW fiber.

The recommended project completion date is May 15, 2027.

The cost estimate for the project is \$77,900,000.